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EDITORIAL

SOMETHING NEW

By Walter Fraine

During the late war the U. S. Bureau of Standards spoke of the electro-plating industry as a "key industry," i. e., "an industry which, while it is not of itself a great magniture, is often of fundamental importance to larger industries," and we as electro-platers know that there are few articles manufactured for the convenience, comfort, adornment or luxury of mankind or for the utilities of business which do not at some time during the course of manufacture, come within the scope of the electro-platers or finishers' art. The public who purchase or use the product have very little conception of the part that finishing plays in adding to the utility or salability of commodities. In order to present to the public an idea of the extent that the art of finishing applies to commodities in general and of the methods and equipment used in the various processes, the Dayton Branch, A. E. S., is putting on an educational exhibit of finished products, materials, processes and equipment used in the prevention of corrosion, preservation, beautification, etc., of metals, wood and other materials. This exposition will be an innovation along educational lines, as it is the first time that an exposition has ever been staged on the basis of the finish itself and making the process and equipment of secondary importance.

The local manufacturers, merchants and newspapers are giving their hearty commendation and encouragement to what they characterize as "something new, unique, interesting and well worth while" as an educational factor.

It is to be expected that the various branches of the A. E. S. will be intensely interested in the results of this venture of the Dayton Branch with the idea of using this means to illustrate the extent electro-plating enters into modern industry and caters to the comfort, convenience and welfare of the public.

'Let your light so shine before men that they may see your good works."

"Come and learn of us."

THE IONIC THEORY AND ITS APPLICATION TO PLATING

By Oliver P. Watts, Assoc. Prof. University of Wisconsin

From the time when man first deposited metals from solution by means of the electric current he began to speculate concerning the mechanism of this action. Why does the current cause metal to be deposited, and why does it cause metal to be dissolved from the anode by a solution which, without the current, does not attack the material of the anode?

During the century that man has experimented in and studied the electrodeposition of metals three theories have been evolved, one after another, to account for the facts observed. It is only the last of these, the Theory of Electrolytic Dissociation or Ionic Theory, that will now be considered.

According to their behavior when subjected to an electromotive force substances may be classified as insulators or conductors. There is no sharp line of demarkation between these classes. There are many substances which are too poor conductors to serve usefully for carrying current, but whose resistivity is not high enough for them to be useful as insulators ,and they are therefore not usually included in either class. We are interested only in conductors. These are divided into two classes—metallic conductors, which are unchanged by the passage of current, and electrolytes, which undergo chemical change in proportion to the current which traverses them.

In order for a substance to conduct electrolytically it must be a chemical compound, and must be fluid. There are two days in which a compound may become an electrolyte—

by fusion, and by dissolving it in some solvent. Many liquid compounds, such as alcohol, chloroform and carbon bisulphide, are non-conductors; and many solid compounds either do not conduct when dissolved in any solvent, or conduct only in certain solvents. There are also a few compounds, some oxides, sulphides, silicides, etc., which conduct in the solid state without undergoing chemical change, and hence are classed with metallic, not with electrolytic conductors.

Since water is the most common solvent that yields conducting solutions, and is the only solvent used for plating baths, this discussion of the ionic theory will be confined to solutions in water.

Water itself does not conduct electricity usefully, and there are many compounds, e. g. soap, glycerine, and alcohol, which dissolve without rendering it a conductor. On the other hand the dissolving of acids, alkalies, and metallic salts in water render it conductive.

The conductivity of water is not increased to the same extent by the dissolving of equal amounts of different substances, nor by the dissolving of chemically equivalent quantities. Some substances are much more effective than others in imparting conductivity to water. The most effective are nitric, sulphuric, and hydrochloric acids, and sodium and potassium hydroxides.

The conductivity does not increase in proportion to the amount of any particular substance that is dissolved, but the rate of increase in conductivity falls off as the solution becomes more concentrated. In the case of substances which are extremely soluble, such as sulphuric acid, sodium hydroxide, and the chlorides of zinc, calcium and magnesium, as the concentration of the solution is increased a point is finally reached where the dissolving of more of the substance actually causes a diminution of conductivity instead of an increase. It follows that, while for most substances a saturated solution is the best conductor, in case of very soluble substances, such as those mentioned above, the maximum of conductivity is reached considerably before saturation. A 30 per cent. solution of sulphuric acid is the best conductor of all mixtures of sulphuric acid and water.

Solutions may be divided into two classes: Electrolytes,

which conduct electricity, and non-electrolytes, which do not conduct. In 1887 Arthenius stated the Ionic Theory as follows: "In all aqueous solutions which are electrolytic conductors the molecules are to a certain extent dissociated by the act of solution into at least two parts, oppositely charged electrically, and it is only such dissociated molecules, or ions, that carry current. The undissociated molecules play no part in conduction.

This is a brief statement of the ionic theory. Note that only ions add to the conductivity of solutions, so that large amounts of salts that ionize only slightly may be added to a plating soltuion without much increase in conductivity. The per cent. of the dissolved molecules that are dissociated into ions depends on the material and the concentration of the solution. In very dilute solutions of good electrolytes, viz., the mineral acids, the alkalies and the sodium and potassium salts of the strong acids, dissociation is practically complete. In very concentrated solutions only a small per cent. of the dissolved substance is dissociated, which accounts for the poor conductivity of concentrated sulphuric acid, and of saturated solutions of zinc and calcium chlorides.

Conductivity of Plating Baths

The electrolytic refiner, who may be using from 1,000 to 2,000 horsepower, is always striving to secure the highest conductivity for his solution, but to the plater conductivity is of much less importance. The solution is the same in all the 1,000 tanks of the refinery, and any increase in conductivity of the electrolyte applies to every tank. The plater is operating many different solutions, and an improvement in the conductivity of his copper solution does not apply to the nickel tank. He must use a generator voltage high enough to drive the desired current through his highest resistance bath, so that any saving in voltage on his other solutions by lowering their resistance does not save a cent on the electric power bill. If his highest resistance solution requires six (6) volts to give the current needed, there is no saving in making additions of sulphuric acid, lye or salt to his other solutions to lower their resistance, for he must still keep his generator set for six volts on account of the high-

resistance solution. The less amount of energy absorbed by the solutions whose resistances have been lowered is merely wasted in the rheostat. The only way he can make a saving in power is to give his attention to raising the conductivity of those solutions which have the highest resistance so that he may lower the voltage of the generator. The power output of the generator equals the product of its voltage by the amperes which it delivers, but the metal deposited depends on the amperes and not at all on the voltage, so that if a plater can improve the conductivity of his solutions so that he gets the same current at a 10 per cent. lower generator voltage he has made a saving of 10 per cent. in power.

What substances shall the plater add to his highest resistance solutions so that he may operate his plating room at a lower generator voltage? There are, as is well known to the plater, few soltuions that will stand the addition of mineral acids, the substances which have the greatest conductivity. The organic acids, acetic, citric, tartaric, oxalic, etc., are but slightly ionized at any concentration, and so are of no aid.

Only a few solutions will stand the addition of sodium hydroxide (lye), so that for general use there remain only salts of the metals. The best conducting of these are the chlorides, nitrates and sulphates of sodium, potassium and ammonium. Nitrates seem to have been avoided in plating baths, possibly because they are reduced by any hydrogen that may be liberated along with the metal deposited.

All of these are much better conductors than are salts of the heavy metals which are deposited from plating solutions, and hence they act as real conducting salts, i. e., they improve the conductivity. Salts of organic acids are so slightly ionized that they are of no value for conductivity.

When only one substance is being deposited, Faraday's law tells us that for the same current the quantity of any particular metal deposited is always the same, and for different metals the amounts are proportional to their chemical equivalents.

An electrolyte is like a theater with the number of tickets limited to the number of seats, and every seat occupied. In this electrolytic theater a patron surrenders his ticket

only on leaving, and on condition that a newcomer at once takes it and enters. Every seat in the electrolytic theater is always filled. The atoms of the elements are the people, and the electrical charges are the tickets of admission and departure. The ions are people who have entered and still hold their tickets, but admission to the electrolyte differs from the usual custom of theaters in that, instead of charging different prices for a single ticket, some persons are required to show one, others two, and still others three tickets, i. e., for atoms to become ions some must have one electrical charge, others two, and still others three charges, according as the valence of that particular element is one, two or three.

So far as can be seen the dissolving of an atom of metal from the anode is simultaneous with the deposition of one at the cathode, i. e., when an iron wishes to leave the electrolytic theater, he makes application to the doorkeeper at the cathode, who takes his ticket, instantaneously sends it around through the cable to the negative pole of the dynamo, from which it is returned via the positive terminal to the anode and handed to an atom of metal there without loss of time, so that a new ion enters there to take the place of the one which gave up its charge at the cathode and became metal. For an atom of metal to enter the solution it must obtain in some way the proper number of electrical charges, and for metal to plate out of solution the metallic ion must dispose of its charge. It is not necessary, however, that the departing ion shall give its charge to the negative pole of a dynamo, storage battery, or voltaic cell, nor that the entering ion shall have received its charge from the positive pole of one of the above sources of electrical energy. An ion may give its charge directly to the atom of a different metal. This is seen on putting a piece of clean iron into a solution of copper sulphate. As soon as an ion of copper touches the piece of iron it hands over its two charges to an atom of iron, and escapes from solution as metallic copper, while an iron ion takes its place in the solution. This process will continue as long as copper ions can come in contact with the iron. The function of a dynamo in plating is to collect tickets at the cathode and so permit

metal to go out of solution there, and to pass the tickets (electrical charges) around to the anode, so that metal may enter there.

So far only metallic ions, which carry positive charges, have been considered; but when the molecules of a dissolved substance ionize, for each positive charge carried on a metallic ion, there is an equal number of negative charges carried on the non-metallic part of the salt or acid that was ionized. Like the metal ions, the hydrogen ion is positively charged, and is liberated at the cathode. Negatively charged ions, on the other hand, move toward the anode, and are liberated there if they escape from soltuion at all. Opposite charges of electricity neutralize each other, so when a negatively charged ion is set free at the anode its charge neutralizes an equal number of positive charges from the dynamo, and there is a shortage of positive charges, which results in a deficiency of metal entering solution from the anode. In other words, the efficiency of solution of the anode is less than 100 per cent. Oxygen is the element whose deposition is usually the cause of low anode efficiency.

If there are many hydrogen ions in the solution, i. e., much of any strong acid present, there is a possibility that some of these hydrogen ions will hand their charges to the doorkeeper at the cathode and escape from solution along with the metal that is being deposited. In this event the current efficiency of deposition of metal is less than 100 per cent.

The plater knows by experience that solutions of zinc, iron and nickel cannot be strongly acidified without causing much of the current to be wasted in the deposition of hydrogen, or in terms of the ionic theory, many hydrogen ions cannot be present without their taking part in electrolysis and being deposited at the cathode. There is a preference for deposition of hydrogen instead of these metals. To solutions of copper, silver, platinum and gold much free acid may be added, i. e., many hydrogen ions may be present, without any serious deposition of hydrogen —the preference is for the discharge of the metallic ion rather than the hydrogen ion. The solutions of the precious

metals referred to above are the chloride or nitrate as used by the refiner, not the cyanide solutions used by platers, in which the addition of acid would result in the liberation of hydrocyanic acid, with results fatal to the plater as well as to the character of the metal deposit.

How is it that large amounts of boric acid can be added to the nickel solution without causing a disastrous liberation of hydrogen? Boric acid is about the weakest of all acids. It has so little of the character of an acid that oculists use a solution of it as an eyewash. To a chemist the difference between a strong and a weak acid is that the former yields a large number of hydrogen ions when dissolved in water, while the per cent. of the weak acid that is dissociated is small, and the number of hydrogen ions is few. Although many pounds of boric acid are present in a nickel solution hydrogen ions are so few that they cannot be deposited to any serious extent in place of nickel ions. As soon as these few hydrogen ions are removed, however, more of the boric acid dissociates and so maintains that very small concentration of hydrogen ions which is desirable for a white nickel deposit.

We have seen how current enters the solution at the anode and how it leaves at the cathode, by atoms of metal taking electrical charges from the anode and becoming ions, and by ions that are touching the cathode giving up their charges to that electrode and attaching themselves to it as a metal deposit, and how the dynamo makes the action go on by collecting the positive charges from the cathode and passing them around to the anode so that new ions can enter the electrolyte. Within the solution the ions are marching like two armies of snails, the positively-charged, metallic ions toward the cathode, and the negatively-charged ones toward the anode. The passage of electricity through an electrolyte is then like the movement of mortar by a line of hodcarriers—man and mortar go along together until they reach their destination, in this case the electrodes. Different kinds of ions move at different speeds—if a motion so slow as theirs can be referred to as **speed.** This movement towards the electrodes is called the "migration of the ions", and its velocity is proportional to the voltage impressed. Hydrogen has by far the greatest velocity, 10.8

cm. per hour at 1 volt, while the migration velocity of the silver ion is 1.7 cm. The procession of the ions has been compared to an army of snails, but this is a slam on the speed of the world's champion slowcoach, for it would be a slow snail indeed that could crawl only its own length in an hour, which is about the distance traversed in that time by the ions of the metals usually deposited by platers.

The removal of metal causes the film of solution in contact with the cathode to have a lower density than the main body of electrolyte, and as a result it rises along the cathode. At the anode a layer of denser solution is formed by the dissolving of metal, and there is a downward motion of this stronger solution which can be plainly seen when plating is carried out in a tank of clear glass. In a still solution in which the electrodes extend only half way to the bottom, after an hour or two a distinct stratification of the solution can be seen, with a clearly-marked boundary between the dense solution at the bottom and the dilute one on top.

Migration of ions is so much slower than this motion of the solution due to changes in density at the electrodes, that most of the ions that pass into solution at the anode are carried bodily to the bottom of the plating tank instead of directly across to the cathode where they are needed. In order to keep up the metal content at the cathode the refiner circulates his solution continuously. Some day the plater may do the same, although at present for preventing such stratification he usually relies on the removal and insertion of successive batches of articles to be plated, and a thorough mixing at the end of the day.

The percent of the molecules of each dissolved salt which dissociates into ions depends on the material of the salt and on its concentration, so that the dissolving of more of any salt not only changes the number of molecules in the solution, but the number of ions as well. At the anodes of a plating bath only positively-charged ions enter the solution, but at the same time a stream of negatively-charged ions is migrating toward the anode, so that there is an accumulation of both positive and negative ions around the anode. This would soon result in the number of ions there becoming disproportionate to the number of molecules, if

the excess of positive and negative ions did not at once unite with each other into molecules. Dissociation into ions, and recombination into molecules is constantly occurring at different places in the solution to maintain the proper ratio between numbers of ions and of molecules. It is generally agreed that every ion in the solution assists in carring current through the main body of the electrolyte, but that only those which pass into or out of solution at the electrodes transfer current between the solution and electrodes. This brings us to the conclusion that what happens at the electrodes depends at any particular moment only on the current density and the nature and concentration of materials that actually touch the electrodes. At the cathode of a plating solution there are always at least two possibilities,--the deposition of metal and the deposition of hydrogen; and, as has been pointed out above, there is a perference for the deposition of one of these. If there are plenty of ions of that one to carry out of solution all the current which passes, only that ion will be deposited; but if there is an insufficient number of these ions in contact with the cathode to carry all the current at that moment, then enough of the second ion will be deposited to supply the rest of the current. The relative concentration of the two ions will evidently be a factor in determining whether only one or both ions will be deposited. It is well-known that a larger current can be used in strong than in weak plating solutions. This is not only because the stronger solution contains more ions of the metal, but the undissociated molecules of the metallic salt act as a reservoir of ions. As ions of the metal are removed by deposition, not only are ions migrating to the cathode carrying the current, but molecules of the salt dissociate until the original ration between ions and undissociated molecules is restored. In spite of these two sources of metallic ions there would soon be a deficiency of them in actual contact with the cathode, were it not that diffusion brings them in from the full-strength solution just back of the layer that is in contact with the cathode. It is because of this that so much greater currents may be used in strong than in weak plating solutions. The value of motion-plating and stirring lies in their assisting diffusion in maintaining a supply of metal ions at the surface of the cathode.

The greatly increased current density which may be employed when a plating solution is heated is due to a lowering of the viscosity of the solution so that the ions move much faster, and to a more rapid diffusion of the molecules of the metallic salt. Convection currents caused by heating also assist in supplying metal at the cathode.

To summarize:

In aqueous solutions that conduct electricity, a certain per cent. of the molecules of the dissolved compounds have separated into at least two parts, oppositely charged electrically.

The number of charges carried by an ion is the same as its valence.

Conduction varies with the number of ions and the velocity of their migration.

Molecules take no part in conduction, but constitute a body of reserves that supplies new ions when the original ones are removed.

Positively charged ions, the metals and hydrogen, move toward and are deposited at the cathode; negatively charged ions migrate toward the anode.

As soon as an ion has given up its charge of electricity to an electrode it becomes the familiar chemical element, copper, silver, chlorine, etc.

An electrolyte is like a street car so crowded that not a single individual can enter until some one gets off. There is only one exception to this for electrolytes, viz., when there is in solution some ion that is capable of changing from a higher to a lower valence, like the change from a ferric to a ferrous salt. A solution of ferric chloride can dissolve iron, i. e. cause iron ions to go into solution without the aid of the electric current, and without any other ion being pushed out of solution.

METAL FINISHING

By R. J. Hazucha, Chicago Branch, A. E. S.

This paper is written for the purpose of pointing out the difficulties of a metal finishing foreman which are not always under his supervision and which are at times his chief troubles, rather than giving a detailed description of a defi-

nate plating or finishing problem. Metal finishing from a manufacturing standpoint is a necessary evil and seldom receives credit for the part it plays in the various industries. More than 50% of articles finished today are not only finished for selling purposes, but are also protected against corrosion, which means conservation of materials. When we begin to analyze finishing it becomes necessary to separate same into three groups, namely, Preparation, Application and Preservation.

Preparation of Parts for Finishing

One of the first steps in preparing parts for finishing is cleaning. All parts that come to the finishing department should be reasonably clean from heavy lubricating compounds, oils and machine chips. It is also a good policy to clean parts between machining operations, for it has a direct bearing on the life of the tools used in manufacturing the parts and on the cost of finishing. When parts are full of heavy lubricants, chips and grit adheres to them readily and when they put through the succeeding operations the tools become dull and scratched or the articles become full of small impressions which requires extra labor to remove; also when parts are full of oil and have to be cut down, it is a very difficult operation to perform economically on account of too much lubrication on the buff. Buffing compositions when properly selected to fit a certain class of work and definite peripheral speed of a buff, contain enough lubricant and binder to make them adhere to the buffs and perform their duty; but when additional lubricant is added in the form of heavy oils on the surface of the parts, the cutting officiency is immediately lowered, which means that more power, more buffs and more compositions are necessary to obtain satisfactory results. To illustrate this properly, let us consider a grinding wheel which, when properly dressed, gives good results. Let us now apply some heavy oil or light grease on the face of this wheel and we will reduce the cutting efficiency of this wheel at once about 40%. This holds true with cutting down, which is nothing else but grinding in mild form.

The second step in preparing parts for finishing is detail inspection. This can be accomplished much easier if the parts are cleaned and the reason for mentioning inspection

is because it has a direct bearing on the cost of finishing. When parts are finished and then rejected on account of other than finishing defects, the cost of finishing these defective parts is charged to the order and automatically raises the cost of the usable parts. This might seem like a small item, but I venture to say that the elimination of this waste alone would more than pay the inspection required to eliminate such trouble. The Assembly Department would also be greatly benefited if they could receive parts that properly fit instead of trying to hammer them together or sending a few pieces to the Fnishing Department and wanting them at once to finish an order because they had to scrap a few pieces on account of some manufacturing defect. These parts instead of being rejected at the source, traveled the whole manufacturing cycle and when completed scrapped, the difference might be only a fraction of a cent; but when you consider the number of parts over a period of a year, I believe that the exact data in any manufacturing establishment would be astonishing.

Application of Finishing

The subject of Application is very broad and it would be impossible to even start to go into detail on account of the various finishes and methods used. From experience I know that finishing in every case must be adopted to suit manufacturing conditions and the customer's demand, always bearing in mind the requirement of a product after it leaves the manufacturer.

Application of finishing is divided into two distinct classes, namely: Ornamental and Heavy Duty. The ornamental class covers all appliances that are not handled continually, and under this classification comes the sprayed and natural metalic finishes, such as Brushed Brass, Oxidized Copper and the different bronze finishes. During the past few years spraying has taken a foothold on the American manufacturers, and today some very pleasing and substantial finishes are obtained by this process. These finishes, however, are not as artistic as the metalic ones, but the cost of producing them is so much cheaper and faster that a manufacturer is justified in their application in these competitive days. However, the honest manufacturer of today is up against a perplexing problem on account of the cheap

competitors, who, in order to put this article on the market, must sell them cheap, and in order to do that they make such appliances out of tin coated or hot rolled steel, then apply a sprayed finish on the surface, hence the reason for a lot of cheap articles on the market. This necessary evil has its bearing on the selling force of the good manufacturer, because they must fight harder to get orders than the fellow that has a cheap article; therefore, it is very essential that the good manufacturer teaches his selling force not only to know their own product, but also their competitors, so that they are prepared to convince their customers why they are charging more than the other fellow, and in this way, with good service, get their business.

The heavy duty finishing is, most of the time, such that it protects articles against corrosion and the elements of the air. Zinc and Cadmium plating are two outstanding methods used for this purpose, zinc being preferable on account of its cheapness and easy application. Other heavy duty appliances are protected with baked enamel and pigment paints; those, however, are never as reliable as those properly zinc plated, but are essential in the trade on account of certain colors desired by the customer who does not appreciate the value of zinc, even if it is not a very good looking finish. There are a lot of articles made that are zinc plated first and then painted to the desired color, and these are best protected against all atmospheric conditions.

Preservation

Lacquers are generally used in preserving the finished articles with the possible exception of nickel, which, being a very hard metal to corrode and not very easily tarnished, does not require the lacquer protection. Great care must be taken in chosing lacquers for finishing on account of the difference in lacquer composition. All lacquers come under three distinct classifications, namely: All Cotton, the Combination Cotton and Gum and the pure gum or water dip lacquer. The Cotton lacquer is used for silver, silver plated parts and for inside of electrical heating reflectors on account of its ability to withstand the heat without discoloration. The Cotton Gum combination lacquer is the most generally used for all clear lacquering by brush spray or dipping process. It is also used with bronze powders and pig-

ments, and when properly made, gives a manufacturer a wide field for its use. The quality and price is determined by the quality gums and cotton used. The pure gum lacquer is used for water dip lacquering. This is possible because when gums are dissolved with proper solvents they will not combine with water but will precipitate, which will then settle on the bottom of the container and can be drained. This lacquer, when properly used, saves the manufacturer a lot of money and time, but on account of being a pure gum product, it requires more time to dry than the two already mentioned. A lot of so-called water dip lacquers are made from cheap gums and sometimes rosin. These are always cheaper than those made out of high grade gums and people using them have no regard for quality finish at all. When parts finished with this type of lacquer come in contact with each other they become chalked very readily, which condition you can readily observe in any department store where lots of cheap hardware is sold. Clear lacquers are used for metallic finishes only where such finish is previously obtained, by buffing, scratched brushing or plating. When other colors are desired it is necessary to use pigments or various colored bronze powders for mixing with the clear lacquer and in this way various pleasing and also freak finishes are obtained. All work to be lacquered must be chemically clean, same as for plating, before good results can be obtained. In fact ,the watchword of a finishing department must be "cleanliness."

After articles are finished and lacquered they represent a certain amount of investment and should be handled as such. However, a good many assembly and packing departments handle these finished parts like a farmer does potatoes, without any regard for quality or cost of producing such a finish. This is absolutely wrong, because the finish is a very big item in selling and the utmost care should be exercised in preserving same. It is my sincere belief that executives in charge of the assembly, packing and stock chasing department should work in the finishing department for a short period of time to learn the routine and care exercised in finishing, because most of them have an idea that all you have to do is throw a shovelful of work into a plating tank and take it out finished. Learning the routine

would also help them in instructing their help which is one way of eliminating a lot of rejected material. Signs should be displayed in these departments telling the operators to be always careful and never lay finished parts one on top of the other without laying a cardboad in between the layers, and above all, teach employees that they are handling a finished product which always requires their careful attention. About 70% of trouble in most manufacturing establishments is due to carelessness and ignorance of the help which reflect itself on the executives. Some large concerns have gone so far to eliminate this as to put instructors in the various departments with nothing else to do but instruct the help.

The Commercial War we are now facing demands industrial efficiency of which economy is the vital part, and in order to compete, we must increase our production and reduce cost, and the elimination of waste alone offers, without any further effort on our part, without extra labor or investment, a means for automatically increasing production and reducing cost. With this in view there are better times ahead of the aggressive plater, because he has the knowledge of eliminating a lot of waste in a manufacturing plant through preservation.

PRESIDENT BOTTS' ADDRESS

By William G. Bott

Chicago Banquet

As president of Chicago Branch it is my pleasing privilege to extend a most cordial greeting to all guests, Supreme Officers, members and friends, and on behalf of Chicago Branch, A. E. S., to welcome one and all to this, our eleventh, annual banquet.

The custom of holding this banquet year after year is a good one. The good fellowship enjoyed, acquaintances made, friendships formed and renewed year after year around this festive board are of great value and the exchange of ideas and helpful discussion of trade topics are directly beneficial, both to the members of our society and the public at large.

The idea of a trade association or society is not new. There is ample evidence that in olden times, before the

Christian era, artisans who wrought in brass, copper and iron, realizing the importance of their handicraft, at various times and places banded themselves together into associations to gain recognition and by counselling together to improve the state of their art in exactly the same way that we have been doing. It is also known that they divided the members of their crafts into grades, requiring a novice to attain a certain degree of proficiency before being advanced to a higher grade, and we might perhaps profit by their example that is debatable. There is no doubt, however, that many of the artisans of ancient times possessed higher intelligence tha ntheir rulers. In all ages the greatest minds have ever been unsparing in their praise of the workman skilled in the useful arts. The mythical lore of the blind poet Homer tells of the powers of Vulcan, the God of the forge who fashioned spears, swords and shields for the warriors. We are told that by his great skill in curious smith work he could execute upon the surfaces of shields and other armor pictures of battle scenes and other events.

More modern history informs us that in the thirteenth century King John of England, being appraised that trade associations or Guilds were secretly adopting rules and regulations out of harmony with those of the constituted authorities determined to obtain first-hand information. He disguised himself as a workman and applied for admission, but on examination it was found that he was not a skilful workman and he was about to be turned away when he disclosed his identity to the members of the Guild who felt greatly honored by his presence and elected him to honorary membership in their society and explained to him their aims and objects. As a mark of his approval the King had erected for their use a great hall, which he named the Guild Hall, and which to this day is one of the show places of London. The practical application of useful knowledge is just as important in our day as it was in the thirteenth century, and it is gratifying to know that our Government at Washington has authorized the appropriation of a considerable fund for research work which will be of high importance in art of electro-plating.

The growing strength of our society with branches in nearly all the large manufacturing centers proves that it is a necessary and beneficial organization, although there are some of our fellow craftsmen outside of our society who misunderstand our aims and objects. We are not a trade union, dealing with wages, hours or shop conditions. We are not a platers' supply house association interested in certain brands of supplies. We are just as our MONTHLY REVIEW states: A Society for the Advancement of the Science of Electro-Plating and Finishing, by trying to help each other with open discussion, practical talks and demonstrations, and in every way possible to dignify our profession. The art of electro-plating is of the highest importance. No amount of advertising or publicity will offset the handicap existing by reason of poorly finished or poorly plated articles.

With your permission at this point I will indulge in a slight digression. To the young vocational student our science seems little short of a miracle. The elemental mysteries of electro-decomposition and redeposit have often held the rapt attention of the students while the teacher propounded the principles and compounded the solutions, dissolved the metal salts and explained their action in saturation and in being carried on the electric current, active both in the matter of decomposition and deposit and also as a medium of affinity between anode and cathode, balancing nicely the acids and alkali, employing the scientific laboratory instruments, appling the electric current of very low voltage and high amperage and explaining the reason for so doing, using a piece of nickel for anode and a brass door key for cathode, explaining the preparation of the article to be plated and the need of absolute chemical cleanliness, calling the attention of class to the bubbles on the surface of the cathode as the deposit commenced to take place, explaining all the while the theory and action in detail.

Now, all this is interesting but of little practical value. We are interested in the practical application of these theories. We are dealing with applied science. When manufacturers produce an article which is required to be electro-plated they set aside a certain part of the estimated cost for that purpose. There is no theory or romance about

this. It is our problem to add the beauty, lustre and attractiveness of articles of commerce at a price which will not retard their sale. On this account it is important for us to endeavor to keep close to the essentials, simplifying the means of obtaining high quality and adequate quantity, standardizing methods and observing high ethical practices.

The Research Committee and the Bureau of Standards have been of great help in supplying new data and standardizing established formulae, and also perfecting unreliable ones. They have rendered invaluable service in keeping before us the substance of our aims and objects. The technical papers and lectures delivered by eminent chemists and metallurgists are of a permanent educational value which is beyond computation. The thanks of our society is extended to the gentlemen for their splendid service. I desire to make special mention of the research and practical work of the faculty of the University of Wisconsin.

Our society organ, the MONTHLY REVIEW, is our means of disseminating useful knowledge regarding actual day-by-day problems. We have the means of making it bigger and better so that it may be of even better service. Let me urge you to send to the editor any items of interest which may come to your attention. Such matter need not necessarily be carefully written, although such help is always appreciated, but if it contains a new thought or a germ of an idea or a new process which would be helpful to any of our membership it will be gladly received and carefully edicted for publication. I also would strongly urge you to advertise among non-members the advantages of membership in the A. E. S. and to employers the benefits of being represented in our society.

In closing, I wish to thank the banquet committee for the efficient manner in which they have managed this annual event, and all the members who have assisted me in my official duties and in every instance when called upon have responded so willingly. The success which has thus far attended our activities has been due entirely to the hearty co-operation of the officers and members. With such teamwork success is a foregone conclusion.

SUPREME PRESIDENT ALLEN

Supreme President Allen Said in Part——

I have formed a theory or opinion with regard to this great Continent upon which we live and to which we owe so many material things that we enjoy.

The almighty God, who created the universe and controls the destiny of the world; held this Continent; greatest of all the divisions of the world in natural resource; the only Continent that could support itself and supply itself with all the necessities and most of the luxuries given to humanity to enjoy; held as I said this wonderful home of mankind from the use of man until man was fitted by experience and acquired intelligence to take full charge of it and to lay the cornerstone of the greatest nation the world has ever known. The first nation to adopt a government of, for and by the people, the first nation in many other important matters, and the first to try and furnish a full and free education to every man, instead of, as had been the practice, to educate the favored few. . .

The American Electroplaters Society hold a unique position in the field of education. Unique first in its qualifications for membership, every active member must be foreman of an electroplating department; this is, I believe, the only international organization composed wholly of that particular class of industrial executives. It is unique in the fact that it is a self-supporting educational society, the only object being education of its membership in its own profession which is done wholly at its own expense.

If I were to use a text to describe the work of this society, and to take it from the Holy Bible, I would be forced to take that one given us from the lips of the Nazerine himself, "Thou shalt love thy neighbor as thyself". That describes the work and object of the society more nearly than any other thing I can say. . .

A score of years ago, the men of our proffession were an aggregation of Sphinx, each one had his own little line of knowledge, and kept it to himself; each would let the others into his confidence, giving his knowledge, for a cash consideration . . .

Today, owing to this society and its work, every member is not only giving to his fellow member, but is giving and

ready to give the benefit of his experience to any fellow plater who may ask the why and where of anything in that experience . . .

Today, through the influence of this society, the very government itself is working along research lines to clarify some of the many theoretical points that are puzzling us . . .

In other words, our whole object as an organization is to educate ourselves in every way that will advance us in our ability to meet the daily requirements of our business. All we can get is too little in most cases, still if our brother member has anything that will be of assistance, we can get it by merely asking for it, or, by putting a question in the box at the next regular branch meeting . . .

In conclusion, the only one sentence which seems to describe work of the American Electroplaters Society is that commandment from the lips of the Christ himself, "Thou Shalt Love Thy Neighbor as Thyself".

FROM E. G. LOVERING

After listening to the fine addresses and the excellent papers that have been read, I want to say, in the words of the Immortal Coue, that "Every day, in every way, the A. E. S. is getting Better and Better." We are becoming a more coalescent society, although at times some of the members in their writing of papers become more or less panegyric, as in the case of Mr. J. Haas in his recent article, "Platers—Past, Present and Future," but even so we are becoming more collective than individual.

In some of our papers we have these words: "The American Electro-Platers' Society (educational purposes only). Now it seems to me that we could elaborate on that a little by adding "and the advancing of the spirit of Good Fellowship and Brotherly Love." And a gathering of this kind is fine to bring this spirit of Good Fellowship to the surface.

You know, according to Mr. Haas, this scientific or technical and deep chemical stuff goes over the heads of some of us old-timers and we are with Daddy Hale when he says: "Dont' know what H2O means to you, but it is a bucket of water to a lot of us." So while the young student plater is combating with the technical part of our profes-

sion and solving our chemical problems for us, we old-timers are not letting that spirit of Good Fellowship lay dormant, and, when we meet together on an occasion like this it means a most pleasant social evening, reminiscent of the days gone by. Can you imagine old-timers like Dad Liscomb, Earnie Lamoureaux, Bill Bott, Dan Whittle, Al Shepherd, Charles Cequem, A. P. Brockway, Walter Allen and a lot of others meeting on an occasion like this? Why, the tales they could unfold would turn a grisly old sea captain green with envy.

When a man gets to be of a certain age he lives in the past, the younger fellow lives for the future, and why is it the past always looks so rosy? I will tell you why: In dreaming over the past we only remember the delightful events; the unpleasant ones we leave buried in oblivion. So, I want to talk tonight to the old-timers, although Mr. Haas does not enthuse very much over us. He reminds me of the old Irish captain who was ordered to take his company to a certain barracks which was some distance away. After about two hour's hike through open country he lost his bearings and stopped a native and asked: "How far is it to camp W. C. X.?" "About three miles," replied the native. So they started on and marched for another hour and they stopped another native and asked: "Say, how far is it to Camp W. C. X.?" He replied, "About three miles," so the captain turned around to his men and said: "Begorry, biys, we are holding our own, anyway." So, in spite of the fact that some of our younger shining lights do not appreciate us old-timers, we are still holding our own.

I remember old Fred Whipple, who started in as a boy at the old Boston Nickel Plating Works under Dr. Adams. It was Fred's duty to go around to each nickel tank after the plater had filled the tanks with work and give the cathode rod a sharp blow with his fist to knock off the gas bubbles—will have to name these gas bubbles "Old-Timers," as they haven't improved on their deportment very much since.

Don't want to criticise Mr. Haas' article, which appeared in the October number of the Metal Industry, as I feel very much like the old Scotchman who was entertaining some of his friends drinking, singing and enjoying them-

selves in their own peculiar way. When it was time for the party to break up, one of the old fellows still sat in his chair with his head down, apparently asleep. One of his friends went over to him and shook him, and in surprise exclaimed: "Why, Mack, he is dead!" The host replied, "I know it, Sandy, I knew for an hour, but I didn't want to tell ye, as I didn't want to spoil yeer evening." And another reason, I noticed as I came into this magnificent Elks' Temple one of their mottos, "The Faults of Our Brothers We Write Upon the Sand; Their Virtues on Tablets of Love and Memory."

BRANCH NEWS

We have very interesting reports from the following branch secretaries:

Chicago, New York, Cincinnati, Cleveland, Connecticut Valley, Pittsburgh, Detroit, Newark, Bridgeport, St. Louis, Providence-Attleboro, Rochester, Milwaukee.

We regret that our space is taken up by material that makes this issue a **Chicago-Dayton** number, and that the secretaries will not be discouraged because their reports are not always printed. Frequently reports are crowded out for lack of space. Keep them coming, boys, we will use most of them.

Providence-Attleboro Branch

The Providence-Attleboro Branch is still digging. The banquet held in the new Biltmore Hotel, January 20, was the best ever held by our branch, and those who have attended our previous banquets know that we always have very successful times. The principal speaker of the evening was the founder of the society, Mr. Charles Proctor, who gave a general history of Electro-Plating from its infancy to the present day. President Levi J. Perkins welcomed guests, and after appropriate remarks introduced the toastmaster, Honorary President Dr. Albert Claflin. We are all familiar with the efficient methods of Dr. Claflin, and on this occasion he was master of ceremonies.

Dr. Madson, who was to have addressed the branch, being unable to attend, his position was very ably filled by Dr. Field of Brown University. His subject was "Metals in Their Original State." His discourse was very interesting and his hearers were entertained to the conclusion of his remarks. A very interesting speaker was the chairman of convention committee of the Providence Chamber of Commerce. He enlightened his hearers on many points of history connected with the State of Rhode Island, and especially the city of Providence. The unlimited points of interest to a visiting body such as the 1923 convention were pointed out by the speaker. We had with us a number of representatives from the various branches who extended greetings from their branches and made appropriate remarks.

CHICAGO BANQUET REPORT

On January the 19th, 1923, the Chicago Branch, A. E. S., held their eleventh annual banquet at the Elks' Club, which is idealy situated for that purpose and adds ,greatly to the pleasure of attending these educational feasts.

We were honored with the Supreme President's presence, Mr. W. J. Allen, who was in the city for a conference with the Supreme Secretary on matters of importance to the Society, so we naturally corralled him to participate in the program with an address on the unique position the American Electro-Platers' Society holds in an educational way in this great United States of ours, which was highly received by the audience.

Mr. William G. Bott, the President of Chicago Branch, opened the after-dinner exercises with a very fine address on the Society, its aims and ambitions and cited a lot of good things along with some history and a complete analysi of the beautiful things this society could do and was doing for the men in this profession, and Bill said a whole lot.

Mr. R. J. Hazucha had a very valuable paper on the finishing of metals, one of those kind that he is always capable of producing, and we can always count on Rudy to come toe the bat with a home run, and we always in Chicago Branch look forward to a hit from him and are never disappointed, and this time it was a real three-bagger.

Dr. O. P. Watts was next speaker on the program with a paper written by himself, "The Ionic Theory and Its Application to Electro-Plating," and gentlemen, this was a paper that was worth a long journey to hear, and was illustrated by the professor as only he can do it in a language that everybody can understand, bringing out the points very forciably, and he surely opened up what seemed to be a blocked passage to the plater which further endears him to our Society, and should make us all proud of the privilege of having an opportunity to hear him speak, and, more so, to know that he is always ready to asist us in our problems.

We were next entertained with a talk on the beauties of Milwaukee, Wis., as the logical place for our 1924 convention, by Mr. Cleveland of the Chamber of Commerce, who was sponsored by the boys from Milwaukee Branch, who are surely a live bunch and mean business.

Last but not least we had with us a speaker who we were all glad to hear, Mr. Ed. Lovering, of the Detroit Branch, who came to the front with a real original topic, The Old-Timer, and he portrayed it so nicely that it kind of made something crack in your back and spine felt just a little shivery and left the feeling with those present that these fellows may be gone but they will all leave memories that even time will never efface.

We had the distinction of having representatives from St. Louis, Detroit, Grand Rapids, Indianapolis, Milwaukee and Philadelphia Branches present, and the grand total of 211 men sat down to an excellent repast, during the progress of which we were entertained by the Appollo Quartette with a lot of special numbers, and then had a nice round of community singing, and all of our members don't have to earn their living at the plating business.

Side Lights on the Chicago Branch Eleventh Annual Banquet

It was kind of harmonious to stand in the lobby of the club and hear someone shout, "Hello, there Pat Bergen, well if there ain't Ed. Musick and Frank Terrio of St. Louis and old Dan Wittig of Milwaukee and Jim Walsh of Indianapolis and E. T. Homan of Philadelphia. Gee, some of you guys are sure a long way from your eats, but the consensus of opinion is, how can you help it when you get the call of the wild, and speeches—boys, if I could only gotten some of that gossip you would need about a 60-page book for two months, and, oh, boys, how the platers can prate."

And that committee efficiency, the chairman, E. Lamoureaux, and the secretary, R. J. Hazucha, assisted by O. E. Servis, F. J. Liscomb, W. G. Meggers, N. P. Hunter, H. A. Gilbertson, C. E. Thornton and Vice-President Emmett, 100 per cent., and the reception committee, consisting of every member of Chicago Branch, unparalleled, and it was conceded by all present that anyone who could have been present and did not come surely missed a real treat that was properly conducted.

We also had a paper from Mr. G. B. Robbins of St. Louis Branch on the "Theory of Cleaners," but the hour being nigh on to 12 o'clock it was decided to publish same in the REVIEW, as the boys were just clawing at the bit to get out in the lobby to visit.

METAL FINISHERS' EXPOSITION

That the ideals prompting the Metal Finishers' Exposition, being carried out by the Dayton Branch, A. E. S., have been appreciated is proven by the hearty response met with. The list below of prominent concerns bears testimony to this appreciation. Their co-operation is an evidence of recognition of the dignity and value of our profession. All spaces have been taken.

Each exhibitor will feature a process or product as indicated:

1. AMER. DISPLAY CO., Dayton, O.—Highly finished toys.
2. E. C. CONLEY ELEC. CO., Dayton, O.—Highly finished household appliances.
3. CLINE OPTICAL CO., Dayton, O.—Safety devices for metal finishers.
4. BALLARD SALES CO., Dayton, O.—Special finishes for automobiles.
5. WESTINGHOUSE ELEC. PROD. CO., Mansfield, O.—Finished electrical heating appliances.
6. NATIONAL CASH REGISTER CO., Dayton, O.—Method for wood finishes on metal.
7. EGYPTIAN LACQUER MFG. CO., New York City—Lacquer enamels.
8. KAY & ESS PAINT CO., Dayton, O.—Process for producing auto enamels and varnishes.
9. COMPUTING AND RECORDING DEVICES CO., New York City—Lacquer enamels in practice and process for.
10. JANTZ & LEIST CO., Cincinnati, O.—Electrical equipment for plating departments.
11. DE LAVAL SEPARATOR CO., New York City—Paint, oils and varnish clarifiers.
12. LASALCO., INC., St. Louis, Mo.—Rotary plating tanks and supplies.

13.a HOHMAN PLATING CO., Dayton, O.—Plumbing specialtics and refinishing.

13.b MAGNUS CHEM. CO., Brooklyn, N. Y.—Electric cleaners and cleaning materials.

14. MITCHELL ENG. CO., Springfield, O.—Ball bearing direct connected polishing lathes.

15. RIECK SHEET METOL CO., Dayton, O.—Ventilating systems, hoods, etc.

16. AMER. ELECTRO-PLATERS' SOCIETY, Dayton, O.—Operating plating room.

17. AMER. ROLLING MILLS CO., Middletown, O.—Pure iron manufacture and galvanizing.

18. THOS. BUCHANAN CO., Cincinnati, O.—Plating supplies.

19. J. B. FORD CO., Detroit, Mich.—Cleaning by agitation and cleaning materials.

20.a VICTOR MFG. CO., Dayton, O.—Plating barrels.

20.b UDYLITE CO., Kokomo, Ind.—Cadmium rust-proofing.

21. COFFIELD WASHER CO., Dayton, O.—Electric washing machines, tubfinishes and tinning.

22. GENERAL ELEC. CO., Schenectady, N. Y.—Electric ovens and sheradizing process.

23.a RIKE-KUMLER CO., Dayton, O.—Selected art finishes.

23.b DAYTON MUSEUM OF ARTS—Hand finished silverware.

24. WAUKEGAN CHEM. CO., Waukegan, Ill.—Color lacquers.

25. HILL & GRIFFITH CO., Cincinnati, O.—Polishing and buffing materials.

26. R. F. JOHNSTON PAINT CO., Cincinnati, O.—Lacquer undercoats and anti-rust materials.

27. ROESSLER & HASSLACHER CHEMICAL CO., New York City—Plating chemicals.

28. AMER. CITIES' SERVICE CORP., Dayton, O.—Outdoor finished specialty.

29. DAYTON PLATING & MFG. CO., Dayton, O.—Job plating and auto bumper finish.

30.a U. S. BUREAU OF STANDARDS, Washington, D. C.—Plating research and spray tests.

30.b CINCINNATI UNIVERSITY, Cincinnati, O.—Paint and plating analyses and control.

31.a METAL INDUSTRY, BRASS WORLD, PAINT JOURNAL—Trade publications.

31.b M. G. KOPF, Industrial Engineer, Dayton, O.—Radium exhibit and educational literature.

32. DAYTON AIR BRUSH CO., Dayton, O.—Spraying guns and booth.

As an attraction two lectures will be given daily on popular finishing subjects and according to the following program:

Monday Evening, April 9th

Opening Address—Mr. C. F. Kettering, Vice-Pres. Gen. Motors' Corp.

MEMORIAL HALL, DAYTON, OHIO,
Where Metal Finishers' Exposition will be held April 9-14, 1923

Tuesday—Industrial Day

Raw Materials—Mr. D. M. Strickland

Moving Pictures—Research Eng'r Amer. Rolling Mills Co., Middletown.

Wednesday—Ladies' Day

Household Appliances—Mr. L. M. Williams, Pres. Utensils Co., Fort Wayne, Ind.

Home Finishes and Art—Mr. Theo. Fond, Director Dayton Museum of Arts

Thursday—Finish Day

Enameled Fnishes—Mr. H. F. Kittredge, Vice-Pres. Kay & Ess Co., Dayton, Ohio.

Plated Fnishes—Dr. Wm. Blum, U. S. Bureau of Standards, Washington, D. C.

Friday—Dealers' Day

The Plating Industry—Mr. C. H. Proctor, Plating Specialist.

Finish & Sales—Mr. C. E. Steffney, Sales Mgr., National Cash Reg. Co.

Saturday, April 14—Banquet

Address of Welcome to A. E. S. Visitors—Mr. M. G. Kopf, Director of Expo., Dayton, Ohio.

Response—Mr. W. J. Allen, National Pres. A. E. S.

We feel that the program, likewise supports, judging from the speakers who will participate, the ideals and purposes of the Exposition. The educational advantages presented through the exhibitors and the program are comprehensive and thus will justify attendance. You will note that we have succeeded in gaining support of our ideals in this new project without introducing the slightest inference of the selfish or commercial. The very fact that our exhibitors are varied, and where they apparently manufacture some products they will demonstrate a distinct-

ly different step, proves the strictly educational purpose of the Exposition.

It will interest our fellow members to learn that there is an active movement among art directors throughout the country to more closely unite the beauty of finishes with design in the production of commercial products. Mr. Theodore Pond, director of the Dayton Museum of Arts, and a practical worker in metals, secured by our city from the East, has commended the director and the committee for their ideals in the Exposition. We feel a sense of pride in his recognition and the active part he is taking in assisting us. We are pleased to be among those who are attempting to unite beauty and utility. Our profession has a real opportunity in this direction, and we knew that the Exposiion will go a long way oward giv ng the Metal Finisher the position he deserves in Art and Industry.

Through t'e efforts of Mr. Pond a competition was conducted to design a poster for publicity and to be symbolical of Metal Finishing. A prize was awarded by the Exposition for the poster shown. This poster has been favorably commented upon by advertising experts and will receive due recognition in their circles. This will effect for the A. E. S. a part in other fields than our own. Nothing would be more advantageous for our benefit and future than to be recognized and given a part in other lines of modern endeavor.

The educational booth will contain much literature of value and for free distribution. The committee has made a careful survey of available literature published by specialists in their work and on many subjects of practical value to all. As a special attraction a specimen of radium will be shown in this booth. The committee responsible for the Exposition is as follows: M. G. Kopf, chairman; W. Fraine, secretary; H. J. Harter, J. I. Pace, A. Lamoureux.

ELECTED TO MEMBERSHIP

New York Branch

Joseph L. Downs, Active.....403 Claremont Ave., Brooklyn, N. Y.

Pittsburgh Branch

Harold Trembicki, Associate .....2025 Wendover St., Pittsburgh, Pa.

St. Louis Branch

Charles P. Reiber, Active .....121 E. Delaware St., Evansville, Ind.
Albert Barth, Active .....6517 Hobart St., Wellston, Mo.

Philadelphia Branch

Louis A. Edelman, Associate .....1820 Wellington St., Philadelphia, Pa.
Joseph E. Underwood, Active.....1114 Cooper St., Camden, N. J.

Cleveland Branch

Seymour C. Kneeland, Active.....3914 Memphis Ave., Cleveland, O.

Chicago Branch

Zeno Benfer, Active .....c|o Frank Holton Co., Elkhorn, Wis.

Providence-Attleboro Branch

James Garde, Active .....437 Central Ave., Pawtucket, R. I.

Detroit Branch

Eugene Allston Murphy, Associate.....Shepard Art Metal Co.
Harold W. Woodmansee, Active.....American Electrical Heater Co.

APPLICATIONS

Philadelphia Branch

Willard M. Scott, Active.....2213 N. Bancroft St., Philadelphia, Pa.

Newark Branch

Edwin B. Anderson
c|o Eastern Tool & Mfg. Co., 129 Bloomfield Ave., Bloomfield, N. J.

Hartford Branch

Paul C. Kramarcik, Active .....128 Main St., East Hampton, Conn.
Moonrad Mosesian, Active .....79 Hamilton Ave., Norwich, Conn.
Robert Mandeville, Active .....Midian Ave., Windsor, Conn.

Detroit Branch

Frank C. Furze, Active .....Shepard Art Metal Co.
Harry Moses, Active .....Ford Motor Co.
Sidney A. Mount, Active .....Ford Motor Co.
Joseph Schornak, Active .....Ford Motor Co.
James A. Garvie, Active .....Ford Motor Co.

Chicago Branch

Ivan Ling, Active .....c|o Chicago Flexible Shaft Co., Chicago, Ill.

St. Louis Branch

Albert Barth, Active .....6517 Hobart St., Wellston, Mo.
Charles P. Rieber, Active.....121 E. Delaware St., Evansville, Ind.

New York Branch

Jos. L. Downes.....403 Clermont Ave., Brooklyn, N. Y.
Wm. Laughlin .....35 Broadway, Brooklyn, N. Y.
Edgar Le Tannert..2356 Waterbury Ave., Unionport Branch J, Bronx, N.Y.
Thomas A. Gardner.....171 Uhlmadt St., Rutherford, N. J.

REINSTATEMENTS

Milwaukee Branch

Ben Baranski .....c|o R. Stuernagle, 1508 Coosorden, Milwaukee, Wis.

Cleveland Branch

G. A. Barrows, Active .....2017 98th St., Cleveland, O.

Chicago Branch

Albert Koppler, Active .....Peoria, Ill.

SUSPENSIONS

Philadelphia Branch

Charles R. Mehl
A. Kaufman .....160 N. 2nd St., Philadelphia, Pa.

Indianapolis Branch

M. E. Burns.....Emergency Dept., City Hall, Indianapolis, Ind.

Chicago Branch

Owen J. McKee ....Neenah, Wis. J. B. Kingsworth ..Rock Island, Ill.
Albert Kappeler .....Peoria, Ill. J. P. Lama .....Chicago, Ill.
Frank D. Denz .....Los Angeles, Cal.

Providence- Attleboro

Charles L. Andette .....Attleboro, Mass.
W. N. Anclar .....Attleboro, Mass.
H. G. Grant .....23 Steere St., Attleboro, Mass.
Wm. P. Nixon .....10 Oakland St., Attleboro, Mass.
Winfred Parelle.....Chartley, Mass., P. O. Box 38
George Snagg .....Waterbury

METAL FINISHERS EXPOSITION

The first of its kind—a sure indication that the AES is a progressive organization especially the

The Dayton Branch

OBJECT:

To tell the world how art and science combined to produce the beautiful finishes on metal that are seen and admired in every home. For further information see page 3, 23-26.

APRIL 9-14, 1923

MEMORIAL HALL, DAYTON, OHIO